SureServo® AC Servo Systems

*Sure*Servo™ AC servo systems

The *Sure*Servo family of brushless servo systems from AutomationDirect is fully digital and offers a rich set of features at dynamite prices. Choose from eight standard servo motors that are used in combination with one of three standard servo drives.

- Eight standard systems from 100W to 3kW
- Use with AutomationDirect CLICK, *Direct*LOGIC, or P3000 PLCs; or any other host controller
- Drives feature on-board indexer and adaptive tuning modes
- Free setup software
- 30-day money-back guarantee
- Two year warranty

*Sure*Servo family

The *Sure*Servo family is designed for flexibility and quick implementation. *Sure*Servo drives accept a wide range of command sources:

- Built-in motion controller w/preset position, velocity or torque
- Select presets with switch inputs and/or the multi-drop Modbus serial interface
- Position commands with "pulse and direction" or "count up and down" format
- Analog voltage Velocity or Torque command
- Encoder follower

For configuration, tuning and diagnostics, use the drive's integrated keypad /display or take advantage of the free *Sure*Servo Pro™ PC-based software. Tune the system easily with adaptive auto-tuning selections or a manual mode.

Adapt to diverse applications with configurable I/O, including eight digital inputs, five digital outputs, two analog monitors and a scalable encoder output.

Why use a servo?

The *Sure*Servo servo systems provide the highest possible level of performance for precise control of position, velocity, and torque. Compared to lower cost stepping systems, the *Sure*Servo products provide:

- More torque at higher speeds (up to 5,000 rpm)
- Broader range of power (up to 3kW)
- Higher response with closed-loop control (high hit rate without stalling or lost position)

CHECK OUT OUR PRICES

Servo Systems	AutomationDirect Price/Part Number	VS.	Allen-Bradley Price/Part Number
Digital Servo Drive	$488.00 SVA-2040		$1,050.40 2098-DSD-005
100W Servo Motor with connectorized Leads	$325.00 SVL-201		$536.31 TLY-A130T-HK62AA
Breakout Board Kit for CN1 Control Interface	$94.00 ASD-BM-50A		$211.09 2090-U3BK-D4401
10' Motor Feedback Cable	$50.00 SVC-EFL-010		$83.22 2090-CFBM6DF-CBAA03
10' Motor Power Cable	$29.50 SVC-PFL-010		$93.62 2090-CPBM6DF-16AA03
Configuration Software	FREE SV-PRO*		$78.07 2098-UWCPRG
*SureServo Pro software is FREE when downloaded and is also available for $9 on a CD			
Complete 1-axis 100W System	$986.50		$2052.71

All prices are U.S. list prices, AutomationDirect prices are from April 2012 Price List. The Allen-Bradley 100W system consists of part numbers shown in table above with prices from www.rockwellautomation.com/en/e-tools 2/20/12.

Sure servo® AC Servo Systems

*Sure*Servo Systems … 3 Standard Drives … 8 Standard Motors … 100W to 3kW

Drive features

- **Main Power and Control Power Inputs**
  - Main Power: 230 VAC 1-phase/3-phase (2kW and 3kW systems are 3-phase only)
  - Control Power: 230 VAC Single Phase; 50/60 Hz
- **Fully digital with up to 450 Hz velocity loop response**
- **Easy setup and diagnostics with built-in keypad/display or the *Sure*Servo Pro PC-based software**
- **Five-in-one command options include:**
  - ± 10V torque or velocity command
  - Pulse train or master encoder position command (accepts line driver or open collector) with electronic gearing
  - Built-in indexer for position control using 8 preset positions and/or position setpoint with serial Modbus
- **Tuning aids include inertia estimation and easy tuning for up to 10 levels of response**
- **Optically isolated digital inputs (8) and outputs (5), analog outputs for monitor signals (2), and line driver output for encoder (with scalable resolution)**

Motor features

- **Low inertia models:**
  - 100W, 200W, 400W, 750W and 1kW
  - Speeds up to 5,000 rpm.
- **Medium inertia models:**
  - 1kW, 2kW and 3kW
  - Speeds up to 3,000 rpm.
- **Square flange mounting with metric dimensions:**
  - 40, 60, 80, 100, 130 and 180 mm flanges
- **Permanent magnet 3-phase synchronous motor**
- **Keyless drive shafts support clamp-on style coupling**
- **Integrated encoder with 2,500 (x4) pulses/revolution plus marker pulse (once per revolution)**
- **Optional 24 VDC spring-set holding brakes**
- **Standard hook-up cables for motor power/brake and encoder**
- **Standard DIN-rail mounted ZIPLink break-out kit for the drive's CN1 connector (with screw terminal connections)**

*Sure*Servo tuning technology

The *Sure*Servo drive closes the loop on current, velocity, and position (depending on control mode selection). Proportional gain, integral gain, feed forward compensation, command low pass filter, and a notch filter for resonance suppression are available. There are three tuning modes:

1. "Manual Mode" for user-defined adjustments
2. "Easy Mode" for default settings over a wide range of programmed inertia with 10 response levels
3. "Auto Mode" for automatic adjustment using an estimated (or measured) value of inertia

*Sure*Servo built-in motion controller

While the *Sure*Servo drives can accept traditional commands from host controls, they can also provide their own internal motion control. For example, up to eight index moves can be pre-defined and stored in the drive and then selected and executed using up to three discrete inputs. The predefined index profiles can also be changed via serial communications. The motion can be incremental or absolute (homing routines are available in the drive) and acceleration can be linear or S-curve.

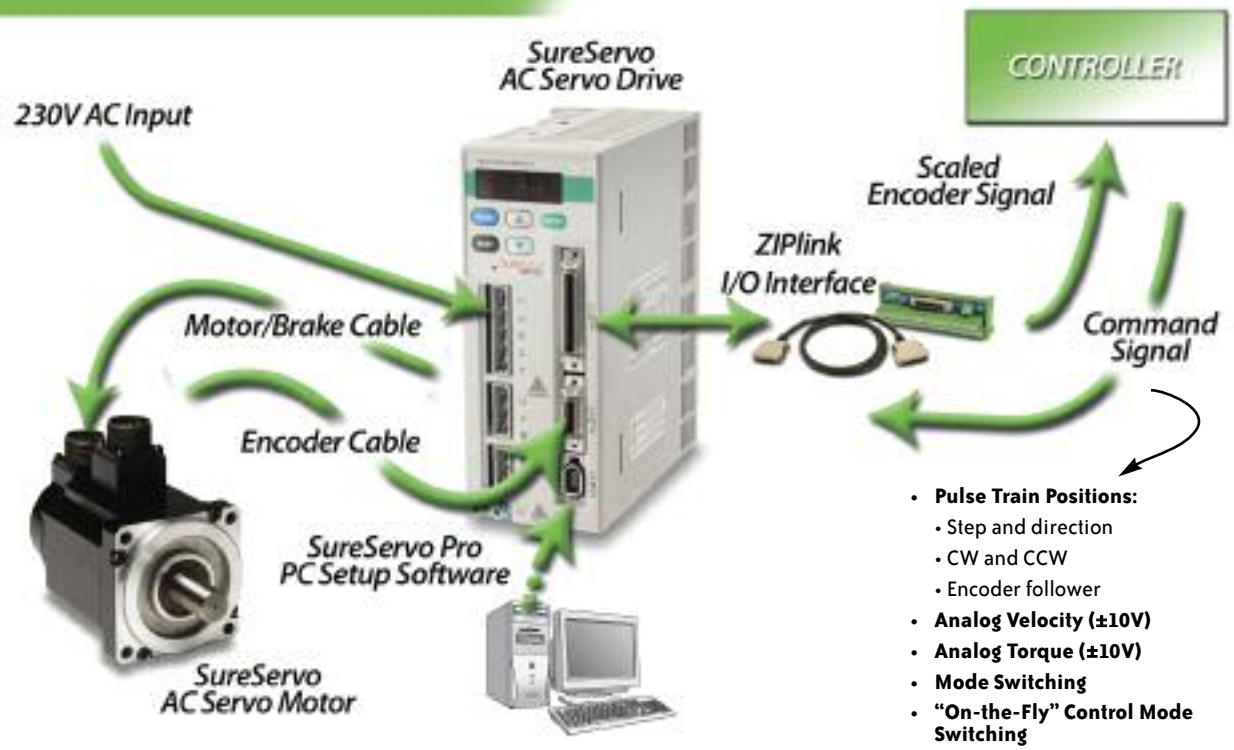
Multiple drives can be daisy-chained and addressed separately using the drive's serial port. This allows very simple yet powerful control of multi-axis processes that do not need precise path control but only precise starting and stopping points. Applications include press feeds, auger fillers, rotary tables, robots for pick and place, test or assembly operations, drilling, cutting, tapping, and similar applications using simple index moves for single or multi-axis motion.

*Sure*Servo Optional Holding Brake

Each *Sure*Servo model of motor can be ordered with an optional 24 VDC spring-set holding brake. This brake holds the motor in place when power is removed.

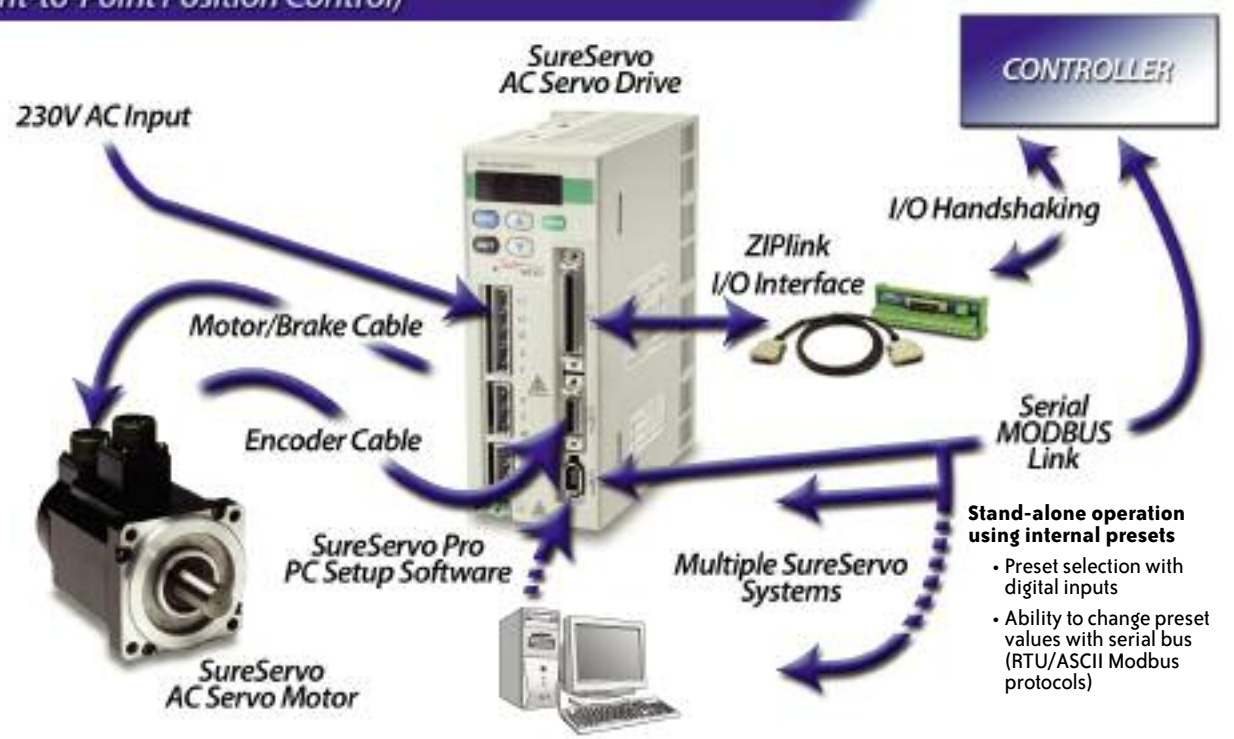
Sure servo AC Servo Systems

Traditional Command Sources



- **Pulse Train Positions:**
  - Step and direction
  - CW and CCW
  - Encoder follower
- **Analog Velocity (±10V)**
- **Analog Torque (±10V)**
- **Mode Switching**
- **"On-the-Fly" Control Mode Switching**

Built-in Indexer
(Point-to-Point Position Control)



Stand-alone operation using internal presets

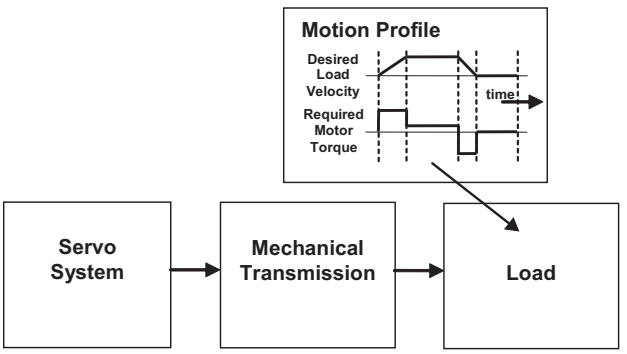
- Preset selection with digital inputs
- Ability to change preset values with serial bus (RTU/ASCII Modbus protocols)

How to select and apply *Sure*Servo systems

The primary purpose of the AC servo system is to precisely control the motion of the load. The most fundamental considerations in selecting the servo system are "reflected" load inertia, servo system maximum speed requirement, servo system continuous torque requirement, and servo system peak torque requirement. In a retrofit application, select the largest torque *Sure*Servo system that most closely matches these parameters for the system being replaced. In a new application, these parameters should be determined through calculation and/or measurement.

AutomationDirect has teamed with Copperhill Technologies to provide free servo-sizing software. "VisualSizer-*Sure*Servo" software will assist in determining the correct motor and drive for your application by calculating the reflected load inertia and required speed and torque based on the load configuration. "VisualSizer-*Sure*Servo" software can be downloaded from www.sureservo.com/downloads.htm.

Information for selecting *Sure*Servo systems is also included in Appendix B of the *Sure*Servo User Manual, which can be downloaded from the AutomationDirect.com website.



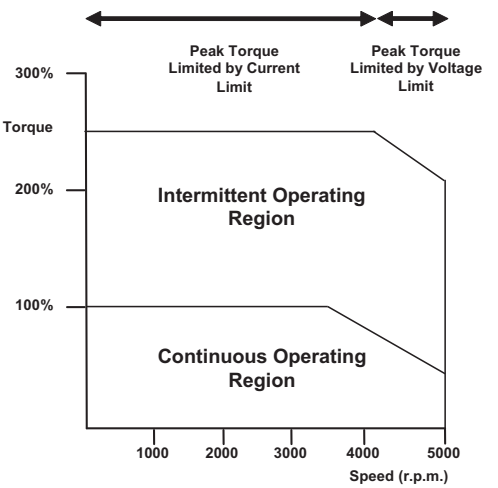
1. "Reflected" load inertia

The inertia of everything attached to the servo motor driveshaft needs to be considered and the total "reflected" inertia needs to be determined. This means that all elements of any mechanical transmission and load inertia need to be translated into an equivalent inertia as if attached directly to the motor driveshaft. The ratio of "reflected" load inertia to motor inertia needs to be carefully considered when selecting the servo system.

In general, applications that need high response or bandwidth will benefit from keeping the ratio of load inertia to motor inertia as low as possible and ideally under 10:1. Systems with ratios as high as 200:1 can be implemented, but corresponding lower bandwidth or responsiveness must be accepted. The servo response including the attached load inertia is determined by the servo tuning. *Sure*Servo systems may be tuned manually, adaptively with measurement of the load inertia, or set with default tuning based on a programmed value of load inertia.

2. Torque and speed

With knowledge of the motion profile and any mechanical transmission between the motor and load, calculations can be made to determine the required servo motor continuous torque, peak torque, and maximum motor speed. The required amount of continuous torque must fall inside the continuous operating region of the system torque-speed curve (you can check the continuous torque at the average speed of the motion profile). The required amount of peak torque must also fall within the servo system's intermittent operating region of the system torque-speed curve (you need to check this value at the required maximum speed).



AC Servo Systems

Application tip - coupling considerations

The *Sure*Servo motors have keyless shafts that are designed for use with clamp-on or compression style couplings. Couplings using keys and/or set screws should NOT be used with *Sure*Servo motors as they are likely to come loose or damage the motor shaft. "Servo-grade" clamp-on or compression style couplings are usually the best choice when you consider the stiffness, torque rating, and inertia. Higher stiffness (lb-in/radian) is needed for better response but there is a trade-off between the stiffness and the added inertia of the coupling. Concerning the torque rating of the coupling, use a safety factor of 1.25 over the *Sure*Servo peak torque requirement of your application.

Coupling Suppliers: www.sureservo.com/couplingconsiderations.htm

Mechanical transmissions

Common mechanical transmissions include leadscrews, rack & pinion mechanisms, conveyors, gears, and timing belts. The use of leadscrew, rack & pinion, or conveyor are common ways to translate the rotary motion of the servo motor into linear motion of the load. The use of a speed reducer such as a gearbox or timing belt can be very beneficial as follows:

1. Reduction of reflected load inertia

As a general rule, it is beneficial to keep the reflected load inertia as low as possible while using the full range of servo speed. *Sure*Servo systems can go up to 5,000 rpm for the low inertia motors and up to 3,000 rpm for the medium inertia motors.

Example: A gearbox reduces the required torque by a factor of the gear ratio, and reduces the reflected load inertia by a factor of the gear ratio squared. A 10:1 gearbox reduces output speed to 1/10, increases output torque 10 times, and decreases reflected inertia to 1/100.

However, when investigating the effect of different speed reduction ratios DO NOT forget to include the added inertia of couplings, gearbox, or timing belt pulleys. These added inertias can be significant, and can negate any inertia reduction due to the speed reduction.

2. Low speed and high torque applications

If the application requires low speed and high torque then it is common to introduce a speed reducer so that the servo system can operate over more of the available speed range. This could also have the added benefit of reducing the servo motor torque requirement which could allow you to use a smaller and lower cost servo system. Additional benefits are also possible with reduction in reflected inertia, increased number of motor encoder counts at the load, and increased ability to reject load disturbances due to mechanical advantage of the speed reducer.

3. Space limitations and motor orientation

*Sure*Servo motors can be mounted in any orientation, but the shaft seal should not be immersed in oil (open-frame gearbox, etc.). Reducers can possibly allow the use of a smaller motor or allow the motor to be repositioned. For example, some reducers would allow for in-line, right angle, or parallel mounting of the motor.

For more information, refer to the website listed below.

www.sureservo.com/mechanical_trans.htm

Ordering guide instructions

The following four pages are your ordering guide for the eight standard *Sure*Servo systems. Each of the eight standard systems has a torque-speed curve including the motor inertia for reference. This is the fundamental information that you need to select the servo drive and matching motor for your application.

Don't forget the cables and *ZIP*Link break-out board kit!

Included in the ordering guide are the available connection cables from the drive to motor in standard lengths from 10 to 60 feet. The break-out board kit includes a 0.5m (19 inch) cable for the CN1 I/O interface, and is listed for your convenience. We highly recommend all five items per system as a minimum. All cables are 100% factory tested to make your system installation as easy and quick as possible. See the Accessories section for regeneration resistors, AC line filters, fuses, contactors, and RF noise filters.

AC Servo System Configuration

*Sure*Servo series drives and motors part numbering system

SV A - 2 04 0

Series
SV: *Sure*Servo AC servo

Component Type
A: Drive
L: Low inertia motor
M: Medium inertia motor

Component Option
0: Drive
Blank: Motor without brake
B: Motor with brake

Rated Output Power
01: 100W
02: 200W
04: 400W
07: 750W
10: 1000W
20: 2000W
30: 3000W

Nominal Input Voltage
2: 230VAC; 50/60 Hz

Here is what you will need to order a complete servo system:

NOTE: Unit can be programmed via keypad.
Optional programming software (free download) and optional programming cable available.

*Sure*Servo AC servo drive, motor, and cable combinations

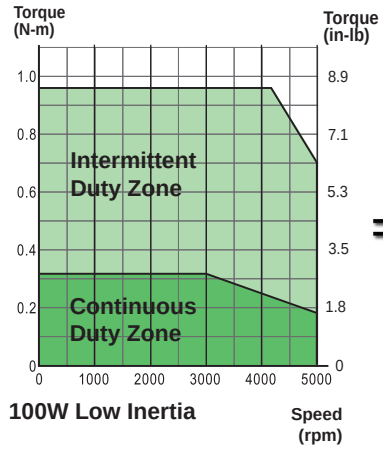
Inertia & Power		Drive and Motor			Power Cables (from Drive to Motor)				Encoder Feedback Cables				Miscellaneous	
Inertia	*Power*	*Servo Drive*	*Servo Motor without brake (note)*	*Servo Motor with brake (note)*	*10 ft*	*20 ft*	*30 ft*	*60 ft*	*10 ft*	*20 ft*	*30 ft*	*60 ft*	*ZIPLink I/O Interface*	*RS-422/485 Serial Communication Cable*
Low inertia	100W	SVA-2040	SVL-201	SVL-201B	SVC-PFL-010	SVC-PFL-020	SVC-PFL-030	SVC-PFL-060	SVC-EFL-010	SVC-EFL-020	SVC-EFL-030	SVC-EFL-060	ZL-RTB50 *and* ZL-SVC-CBL50 or ZL-SVC-CBL50-1 or ZL-SVC-CBL50-2	SVC-MDCOM-CBL
	200W		SVL-202	SVL-202B										
	400W		SVL-204	SVL-204B										
	750W	SVA-2100	SVL-207	SVL-207B										
	1000W		SVL-210	SVL-210B	SVC-PHM-010	SVC-PHM-020	SVC-PHM-030	SVC-PHM-060	SVC-EHH-010	SVC-EHH-020	SVC-EHH-030	SVC-EHH-060		
Medium inertia	1000W		SVM-210	SVM-210B										
	2000W	SVA-2300	SVM-220	SVM-220B	SVC-PHH-010	SVC-PHH-020	SVC-PHH-030	SVC-PHH-060						
	3000W		SVM-230	SVM-230B										

NOTE: Each servo motor requires an encoder feedback cable and a power cable.
The motor power cable includes brake power wires for the optional motor brake.

SureServo AC Servo System Configuration

For all systems:
Order programming software & programming cable if needed. See pgs. 16-31 & 16-32.

100W Low Inertia System

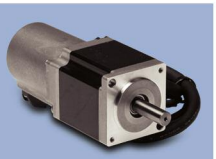


1.

Servo Drive
SVA-2040 <--->

*Sure*Servo Motor

2.



SVL-201 <--->
SVL-201B (w/brake) <--->

Motor Power Cable (1)

3.

SVC-PFL-010 (10') <--->
SVC-PFL-020 (20') <--->
SVC-PFL-030 (30') <--->
SVC-PFL-060 (60') <--->

Motor Encoder Cable (1)

4.

SVC-EFL-010 (10') <--->
SVC-EFL-020 (20') <--->
SVC-EFL-030 (30') <--->
SVC-EFL-060 (60') <--->

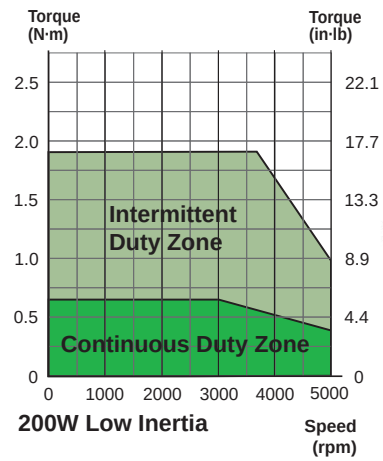
*ZIP*Link I/O Interface

5.

ZL-RTB50 <--->
and one cable below:
ZL-SVC-CBL50 (0.5m) <--->
ZL-SVC-CBL50-1 (1m) <--->
ZL-SVC-CBL50-2 (2m) <--->

J_m= Motor Inertia = 0.000027 lb-in-s² (0.000003 kg - m²)

200W Low Inertia System



1.

Servo Drive
SVA-2040 <--->

*Sure*Servo Motor

2.

SVL-202 <--->
SVL-202B (w/brake) <--->

Motor Power Cable (1)

3.

SVC-PFL-010 (10') <--->
SVC-PFL-020 (20') <--->
SVC-PFL-030 (30') <--->
SVC-PFL-060 (60') <--->

Motor Encoder Cable (1)

4.

SVC-EFL-010 (10') <--->
SVC-EFL-020 (20') <--->
SVC-EFL-030 (30') <--->
SVC-EFL-060 (60') <--->

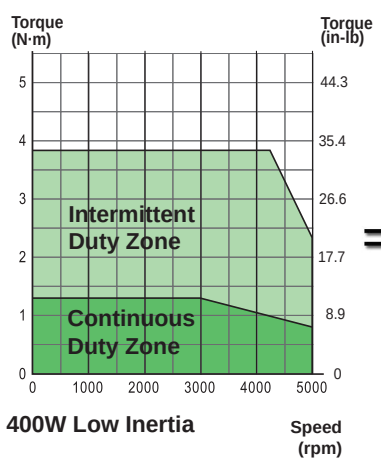
*ZIP*Link I/O Interface

5.

ZL-RTB50 <--->
and one cable below:
ZL-SVC-CBL50 (0.5m) <--->
ZL-SVC-CBL50-1 (1m) <--->
ZL-SVC-CBL50-2 (2m) <--->

J_m= Motor Inertia = 0.00016 lb-in-s² (0.000018 kg - m²)

400W Low Inertia System



1.

Servo Drive
SVA-2040 <--->

*Sure*Servo Motor

2.

SVL-204 <--->
SVL-204B (w/brake) <--->

Motor Power Cable (1)

3.

SVC-PFL-010 (10') <--->
SVC-PFL-020 (20') <--->
SVC-PFL-030 (30') <--->
SVC-PFL-060 (60') <--->

Motor Encoder Cable (1)

4.

SVC-EFL-010 (10') <--->
SVC-EFL-020 (20') <--->
SVC-EFL-030 (30') <--->
SVC-EFL-060 (60') <--->

*ZIP*Link I/O Interface

5.

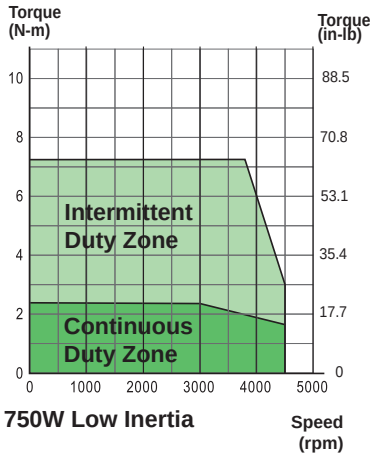
ZL-RTB50 <--->
and one cable below:
ZL-SVC-CBL50 (0.5m) <--->
ZL-SVC-CBL50-1 (1m) <--->
ZL-SVC-CBL50-2 (2m) <--->

J_m= Motor Inertia =0.0003 lb-in-s² (0 .000034 kg - m²)

SureServo® AC Servo System Configuration

For all systems:
Order programming software & programming cable if needed.
See pgs. 16-31 & 16-32.

750W Low Inertia System



1. =

Servo Drive
SVA-2100 <--->

*Sure*Servo Motor

2.

SVL-207 <--->
SVL-207B (w/brake) <--->

Motor Power Cable (1)

3.

SVC-PFL-010 (10') <--->
SVC-PFL-020 (20') <--->
SVC-PFL-030 (30') <--->
SVC-PFL-060 (60') <--->

Motor Encoder Cable (1)

4.

SVC-EFL-010 (10') <--->
SVC-EFL-020 (20') <--->
SVC-EFL-030 (30') <--->
SVC-EFL-060 (60') <--->

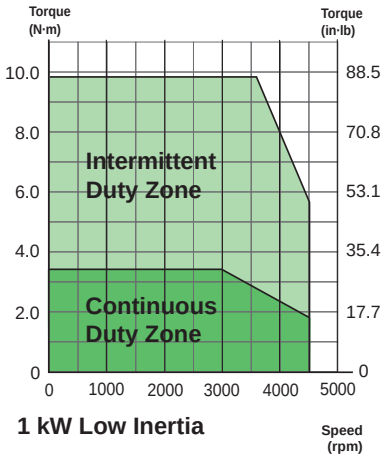
*ZIP*Link I/O Interface

5.

ZL-RTB50 <--->
and one cable below:
ZL-SVC-CBL50 (0.5m) <--->
ZL-SVC-CBL50-1 (1m) <--->
ZL-SVC-CBL50-2 (2m) <--->

J_m= Motor Inertia = .00096 lb-in-s² (0.000108 kg - m²)

1 kW Low Inertia System



1. =

Servo Drive
SVA-2100 <--->

*Sure*Servo Motor

2.

SVL-210 <--->
SVL-210B (w/brake) <--->

Motor Power Cable (1)

3.

SVC-PHM-010 (10') <--->
SVC-PHM-020 (20') <--->
SVC-PHM-030 (30') <--->
SVC-PHM-060 (60') <--->

Motor Encoder Cable (1)

4.

SVC-EHH-010 (10') <--->
SVC-EHH-020 (20') <--->
SVC-EHH-030 (30') <--->
SVC-EHH-060 (60') <--->

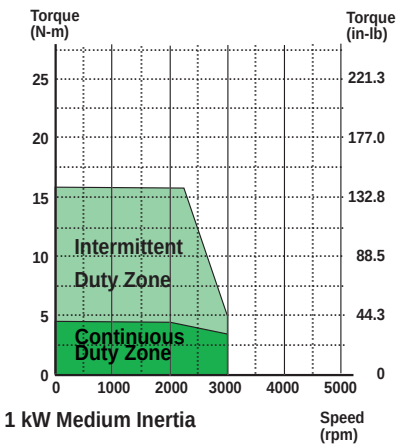
*ZIP*Link I/O Interface

5.

ZL-RTB50 <--->
and one cable below:
ZL-SVC-CBL50 (0.5m) <--->
ZL-SVC-CBL50-1 (1m) <--->
ZL-SVC-CBL50-2 (2m) <--->

J_m= Motor Inertia = .0023 lb-in-s² (0.00026 kg - m²)

1 kW Medium Inertia System



1. =

Servo Drive
SVA-2100 <--->

*Sure*Servo Motor

2.

SVM-210 <--->
SVM-210B (w/brake) <--->

Motor Power Cable (1)

3.

SVC-PHM-010 (10') <--->
SVC-PHM-020 (20') <--->
SVC-PHM-030 (30') <--->
SVC-PHM-060 (60') <--->

Motor Encoder Cable (1)

4.

SVC-EHH-010 (10') <--->
SVC-EHH-020 (20') <--->
SVC-EHH-030 (30') <--->
SVC-EHH-060 (60') <--->

*ZIP*Link I/O Interface

5.

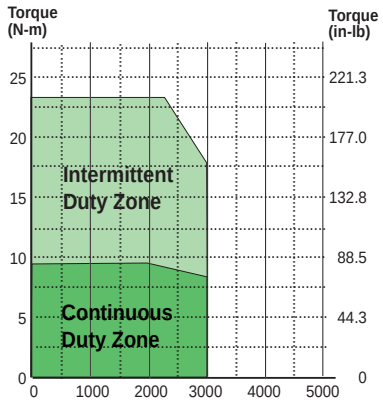
ZL-RTB50 <--->
and one cable below:
ZL-SVC-CBL50 (0.5m) <--->
ZL-SVC-CBL50-1 (1m) <--->
ZL-SVC-CBL50-2 (2m) <--->

J_m= Motor Inertia = .0053 lb-in-s² (0.000598 kg - m²)

Sure servo® AC Servo System Configuration

For all systems:
Order programming software & programming cable if needed.
See pgs. 16-31 & 16-32.

2 kW Medium Inertia System



1. =

Servo Drive
SVA-2300 <--->

*Sure*Servo Motor

2.

SVM-220 <--->
SVM-220B (w/brake) <--->

Motor Power Cable (1)

3.

SVC-PHH-010 (10') <--->
SVC-PHH-020 (20') <--->
SVC-PHH-030 (30') <--->
SVC-PHH-060 (60') <--->

Motor Encoder Cable (1)

4.

SVC-EHH-010 (10') <--->
SVC-EHH-020 (20') <--->
SVC-EHH-030 (30') <--->
SVC-EHH-060 (60') <--->

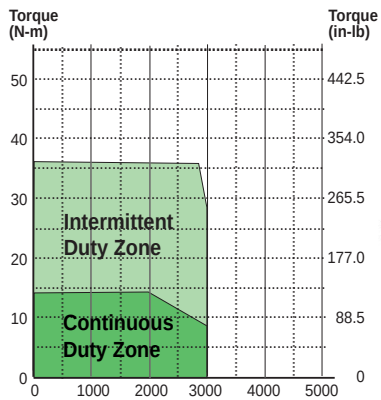
*ZIP*Link I/O Interface

5.

ZL-RTB50 <--->
and one cable below:
ZL-SVC-CBL50 (0.5m) <--->
ZL-SVC-CBL50-1 (1m) <--->
ZL-SVC-CBL50-2 (2m) <--->

J_m= Motor Inertia = .014 lb-in-s² = (0.00158 kg - m²)

3 kW Medium Inertia System



1. =

Servo Drive
SVA-2300 <--->

*Sure*Servo Motor

2.

SVM-230 <--->
SVM-230B (w/brake) <--->

Motor Power Cable (1)

3.

SVC-PHH-010 (10') <--->
SVC-PHH-020 (20') <--->
SVC-PHH-030 (30') <--->
SVC-PHH-060 (60') <--->

Motor Encoder Cable (1)

4.

SVC-EHH-010 (10') <--->
SVC-EHH-020 (20') <--->
SVC-EHH-030 (30') <--->
SVC-EHH-060 (60') <--->

*ZIP*Link I/O Interface

5.

ZL-RTB50 <--->
and one cable below:
ZL-SVC-CBL50 (0.5m) <--->
ZL-SVC-CBL50-1 (1m) <--->
ZL-SVC-CBL50-2 (2m) <--->

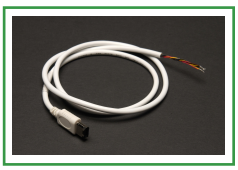
J_m= Motor Inertia = 0.038 lb-in-s² = (0.00433 kg - m²)

NOTE: ALL MOTOR POWER CABLES INCLUDE BRAKE POWER WIRES FOR THE OPTIONAL MOTOR BRAKE.

*Sure*Servo Communications Cables for Muti-drop Networks

Product	Price	Description
SVC-MDCOM-CBL	<--->	RS-422/485 serial communication cable for use with multidrop networks; 3ft length; IEEE 1394 plug to unterminated wires; compatible with all *Sure*Servo systems. Facilitates connection between the *Sure*Servo drive serial port and host controllers.
SVC-232RJ12-CBL-2 *	<--->	*ZIP*Link SureServo Drives cable with 6-pin RJ12 connector to a 6-pin IEEE 1394 connector, shielded, twisted pair, 2.0 meter (6.6 ft.) length. For RS-232 connection to all *Sure*Servo amplifiers.
SVC-485RJ12-CBL-2 *	<--->	*ZIP*Link SureServo amplifier communication cable, RJ12 male to 6-pin IEEE 1394 connector, shielded, twisted pair, 2.0 meter (6.6 ft.) length. Cable used in conjunction with **ZL-CDM-RJ12**xxx distribution module can access a compatible RS-485 device network.
SVC-485HD15-CBL-2 *	<--->	*ZIP*Link SureServo Drives cable with a HD 15-pin male to a 6-pin IEEE 1394 connector, shielded, twisted pair, 2.0 meter (6.6 ft.) length. For RS-485 connection to all *Sure*Servo amplifiers.

**** Refer to the ZIPLinks Wiring Solutions section for complete information regarding the ZIPLink cables.***



AC Servo System Software

*Sure*Servo Pro configuration software

*Sure*Servo Pro is an optional free downloadable configuration software package for the *Sure*Servo drives. With *Sure*Servo Pro installed, the personal computer may be directly connected to the servo drive's serial port via the PC's RS-232 serial port*. A six-foot configuration cable (SVC-PCCFG-CBL, <--->) is available to make the connection between the drive serial port and PC DB-9 serial port simple.

***Note: Use our USB-RS232 converter cable in conjunction with the SVC-PCCFG-CBL cable on PCs having only USB ports.**

Features

- Quick Start - The basic setup when you have limited time and just want to get up and running ASAP.
- Maintenance keypad allows the user to operate the servo system from the PC. This is a great aid during start-up to allow the servo to perform some basic motion and to check the I/O.
- Detailed - The complete setup for all the drive parameters
- Tune and check the servo response live using the scope feature.
- Upload and download the drive setup. Save the drive setup as a file for future use.
- Edit the drive setup
- View all drive faults
- Trend drive variables in real time

System Requirements

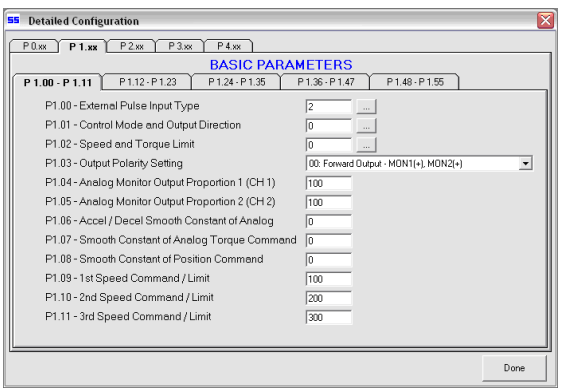
- Windows 7, Windows 2000, XP Pro
- 24 MB of RAM
- 16 MB hard disk
- RS232 serial port or USB port
- Internet Explorer 4.0 or higher (for HTML help support)

Parameter views

The *Sure*Servo Pro configuration tool logically organizes over 165 servo drive parameters into five tabbed groups. Each parameter has a factory default that usually allows the servo to run "out-of-the-box".

The parameters can be easily changed with available options or setting ranges displayed. Tuning modes and parameters can also be changed using *Sure*Servo Pro. After the parameters have been defined, the complete setup can be stored and archived. Drive configurations can be uploaded, edited, saved, and downloaded as often as necessary.

Parameter View Example Screen - Basic Parameters


Detailed Configuration
P 0.xx
P 1.xx
P 2.xx
P 3.xx
P 4.xx
BASIC PARAMETERS
P 1.00 - P 1.11
P 1.12 - P 1.23
P 1.24 - P 1.35
P 1.36 - P 1.47
P 1.48 - P 1.55
P1.00 - External Pulse Input Type
P1.01 - Control Mode and Output Direction
P1.02 - Speed and Torque Limit
P1.03 - Output Polarity Setting
00: Forward Output - MON1(+), MON2(+)
P1.04 - Analog Monitor Output Proportion 1 (CH 1)
P1.05 - Analog Monitor Output Proportion 2 (CH 2)
P1.06 - Accel / Decel Smooth Constant of Analog
P1.07 - Smooth Constant of Analog Torque Command
P1.08 - Smooth Constant of Position Command
P1.09 - 1st Speed Command / Limit
P1.10 - 2nd Speed Command / Limit
P1.11 - 3rd Speed Command / Limit
Done

*Sure*Servo Software and Configuration Cables

Product	Price	Description
SV-PRO	Free	*Sure*Servo Pro configuration software for use with all *Sure*Servo servo systems. FREE download from www.sureservo.com or www.automationdirect.com websites.
SV-PRO	<--->	CD with *Sure*Servo Pro configuration software
SVC-PCCFG-CBL	<--->	Six-foot RS-232 communications cable; connects servo drive serial port to PC DB-9 serial port. *For PCs having only USB ports, use our **USB-RS232** converter cable in conjunction with the SVC-PCCFG-CBL cable.*
SVC-485CFG-CBL-2 *	<--->	*ZIP*Link *Sure*Servo amplifier configuration cable, 6-pin IEEE 1394 connector to RJ45 connector, shielded, twisted pair, 2.0 meter (6.6 ft.) length. *Use this cable in conjunction with our **USB-485M** serial adapter to connect any SureServo amplifier to a PC. Eliminates the need to reprogram networked servo drives from RS485 to RS232 when connecting to a PC.*
**** Refer to the ZIPLinks Wiring Solutions section for complete information regarding ZIPLink cable SVC-485CFG-CBL-2.***		

Motor Controller Communication

Drive / Motor Controller (GS/DuraPulse/SureServo/SureStep/Stellar) ZIPLink Selector							
Drive / Motor Controller		Communications			ZIPLink Cable		
Controller	Comm Port Type	Network/Protocol	Connects to	Comm Port Type	Cable (2 meter length)	Cable Connectors	Other Hardware Required
GS1	RJ12	RS-485 Modbus RTU	DL06 PLCs	Port 2 (HD15)	GS-485HD15-CBL-2	RJ12 to HD15	–
			D2-260 CPU				–
			GS-EDRV100	RJ12	GS-EDRV-CBL-2	RJ12 to RJ12	–
			ZL-CDM-RJ12Xxx*	RJ12	GS-485RJ12-CBL-2		–
			FA-ISOCON	5-pin Connector	GS-ISOCON-CBL-2	RJ12 to 5-pin plug	–
GS2	RJ12	RS-232 Modbus RTU	CLICK PLCs	Port 2 (RJ12)	GS-RJ12-CBL-2	RJ12 to RJ12	–
			DL05 PLCs				–
			DL06 PLCs	Port 2 (HD15)			FA-15HD
			D2-250-1 CPU				
			D2-260 CPU				
			D4-450 CPU	Port 3 (25-pin)			FA-CABKIT
			P3-550 CPU	Port 2 (RJ12)			–
		RS-485 Modbus RTU	DL06 PLCs	Port 2 (HD15)	GS-485HD15-CBL-2	RJ12 to HD15	–
			D2-260 CPU				–
			GS-EDRV100	RJ12	GS-EDRV-CBL-2	RJ12 to RJ12	–
			ZL-CDM-RJ12Xxx*	RJ12	GS-485RJ12-CBL-2		–
			FA-ISOCON	5-pin Connector	GS-ISOCON-CBL-2	RJ12 to 5-pin plug	–
DuraPulse (GS3)	RJ12	RS-485 Modbus RTU	DL06 PLCs	Port 2 (HD15)	GS-485HD15-CBL-2	RJ12 to HD15	–
			D2-260 CPU				–
			GS-EDRV100	RJ12	GS-EDRV-CBL-2	RJ12 to RJ12	–
			ZL-CDM-RJ12Xxx*	RJ12	GS-485RJ12-CBL-2		–
			FA-ISOCON	5-pin Connector	GS-ISOCON-CBL-2	RJ12 to 5-pin plug	–
SureServo	IEEE1394 (CN3)	RS-232 Modbus RTU	CLICK PLCs	Port 2 (RJ12)	SVC-232RJ12-CBL-2	6-pin IEEE to RJ12	–
			DL05 PLCs				–
			DL06 PLCs	Port 2 (HD15)			FA-15HD
			D2-250-1 CPU				
			D2-260 CPU				
			D4-450 CPU	Port 3 (25-pin)			FA-CABKIT
			P3-550 CPU	Port 2 (RJ12)			–
		RS-485 Modbus RTU	DL06 PLCs	Port 2 (HD15)	SVC-485HD15-CBL-2	6-pin IEEE to HD15	–
			D2-260 CPU				–
			ZL-CDM-RJ12Xxx*	RJ12	SVC-485RJ12-CBL-2	6-pin IEEE to RJ12	–
			USB-485M	RJ45	SVC-485CFG-CBL-2	6-pin IEEE to RJ45	–
Stellar (Soft Starter) SR44 Series	RJ45**	RS-485 Modbus RTU	DL06 PLCs	Port 2 (HD15)	SR44-485HD15-CBL-2	RJ45 to HD15	SR44-RS485**
			D2-250-1 CPU				
			D2-260 CPU				
			ZL-CDM-RJ12Xxx*	RJ12	SR44-485RJ45-CBL-2	RJ45 to RJ12	
SureStep	RJ12	RS-232 ASCII	DL06 PLCs	Port 2 (HD15)	STP-232HD15-CBL-2	HD15-pin to RJ12	–
			D2-250-1 CPU				–
			D2-260 CPU (Port2)				–
			DL05 PLCs	RJ12	STP-232RJ12-CBL-2	RJ12 to RJ12	–
			CLICK PLCs				–

** When using the ZL-CDM-RJ12Xxx ZIPLink Communication Distribution Module, replace the lowercase xx with the number of RJ12 ports, i.e.4 for four ports or10 for ten ports. (ex: ZL-CDM-RJ12X4 or ZL-CDM-RJ12X10)*

*** The SR44-RS485 Communications Adapter must be installed for RS-485 communications with the Stellar soft starters.*

Sure gear® Precision Servo Gearboxes

SureGear™ Servo Gearbox Overview

The SureGear PGA series of high-precision servo gear reducers is an excellent choice for applications that require good accuracy and reliability at an exceptional value. This in-line planetary gear reducer has a thread-in mounting style, along with a level of precision and torque capacity that is best in its class. Offered in a concentric shaft design with a maximum five arc-min backlash rating, the SureGear PGA series is an accurate, high-performance, and cost effective solution for any OEM.

The machining quality of the SureGear PGA helical planetary gears provides a very quiet and more efficient reducer than other competitive products that are similarly priced. The SureGear PGA series easily mates to SureServo motors, and is the perfect solution for applications such as gantries, injection-molding machines, pick-and-place automation, and linear slides.

Features

- Industry-standard mounting dimensions
- Thread-in mounting style
- Best-in-class backlash (5 arc-min)
- Four gear ratios available (5, 10, 15, 25:1)
- Mounting hardware included for attaching to SureServo motors
- Helical-cut planetary gears for quiet operation and reduced vibration
- Uncaged needle roller bearings for high rigidity and torque
- Adapter bushing connection for simple and effective attachment to most servo motors
- High-viscosity, anti-separation grease does not migrate away from the gears; no leakage through the seal
- Maintenance free: No need to replace the grease for the life of the unit
- At nominal speed, service life is 20,000 hours
- Can be positioned in any orientation
- 5-year warranty

Applications

- Gantries
- Injection-molding machines
- Pick-and-place automation
- Linear slides
- Packaging machines
- Conveyors

SureGear™ Servo Gearbox Selection

SureGear Servo Gearbox Selection

*Sure*Servo Motor	Gear Ratio	SureGear Gearbox	Motor Nominal Output Torque (N·m [lb·in])	Combination Nominal Output Torque (N·m [lb·in])	Combination Nominal Output Speed (rpm)	Combination Max Output Speed (rpm)	Available Load Inertia @ 5:1 Mismatch * (kg·cm^2 [lb·in·s^2])
SVL-201(B)	5	**PGA070-05A1**	0.32 [2.8]	1.59 [14.1]	600	1,000	1.83 [0.002]
	10	**PGA070-10A1**		3.18 [28.1]	300	500	9.40 [0.008]
	15	**PGA070-15A1**		4.77 [42.2]	200	333	21.38 [0.019]
	25	**PGA070-25A1**		7.95 [70.4]	120	200	60.63 [0.054]
SVL-202(B)	5	**PGA070-05A2**	0.64 [5.7]	3.20 [28.3]	600	1,000	18.50 [0.016]
	10	**PGA070-10A2**		6.40 [56.6]	300	500	76.00 [0.067]
	15	**PGA070-15A2**		9.60 [85.0]	200	333	171.00 [0.151]
	25	**PGA070-25A2**		16.00 [141.6]	120	200	481.25 [0.426]
SVL-204(B)	5	**PGA070-05A2**	1.27 [11.2]	6.35 [56.2]	600	1,000	38.50 [0.034]
	10	**PGA070-10A2**		12.70 [112.4]	300	500	156.00 [0.138]
	15	**PGA070-15A2**		19.05 [168.6]	200	333	351.00 [0.310]
	25	**PGA070-25A2**		31.75 [281.0]	120	200	981.25 [0.868]
SVL-207(B)	5	**PGA070-05A3**	2.39 [21.2]	11.95 [105.8]	600	900	126.00 [0.111]
	10	**PGA090-10A3**		23.90 [211.5]	300	450	465.00 [0.411]
	15	**PGA090-15A3**		35.85 [317.3]	200	300	1053.00 [0.931]
	25	**PGA090-25A3**		59.75 [528.8]	120	180	2931.25 [2.593]
SVL-210(B)	5	**PGA090-05A4**	3.30 [29.2]	16.50 [146.0]	600	900	252.50 [0.223]
	10	**PGA090-10A4**		33.00 [292.1]	300	450	1020.00 [0.902]
	15	**PGA120-15A4**		49.50 [438.1]	200	300	2295.00 [2.030]
	25	**PGA120-25A4**		82.50 [730.2]	120	180	6375.00 [5.639]
SVM-210(B)	5	**PGA090-05A5**	4.80 [42.5]	24.00 [212.4]	400	600	675.00 [0.597]
	10	**PGA090-10A5**		48.00 [424.8]	200	300	2710.00 [2.397]
	15	**PGA120-15A5**		72.00 [637.3]	133	200	6097.50 [5.393]
	25	**PGA120-25A5**		120.00 [1062.1]	80	120	16937.50 [14.981]
SVM-220(B)	5	**PGA120-05A6**	9.40 [83.2]	47.00 [416.0]	400	600	1700.00 [1.504]
	10	**PGA120-10A6**		94.00 [832.0]	200	300	6800.00 [6.015]
		PGA-155-10A6					
	15	**PGA155-15A6**		141.00 [1239.1]	133	200	15300.00 [13.533]
	25	**PGA155-25A6**		235.00 [2079.9]	80	120	42500.00 [37.591]
SVM-230(B)	5	**PGA120-05A6**	14.30 [126.6]	71.50 [632.8]	400	600	5137.50 [4.544]
	10	**PGA120-10A6**		143.00 [1265.7]	200	300	20550.00 [18.176]
		PGA155-10A6					
	15	**PGA155-15A6**		214.50 [1898.5]	133	200	46237.50 [40.897]
	25	**PGA155-25A6**		357.50 [3164.1]	80	120	128437.50 [113.603]

**** Available load inertia is calculated based on servo motor inertia using the formula: Available Inertia = (5·Motor Inertia – Gearbox Inertia)·(Gear Ratio)^2***
A 5:1 inertia mismatch is a good target for design purposes. Systems with lower or higher mismatch may be possible, depending on operating conditions.

Sure gear® Precision Servo Gearboxes

Pricing & Specifications

SureGear™ Precision Servo Gearboxes

Part Number	Price	Ratio	Reduction	Frame Size (mm)	Nominal Output Torque (N·m [lb·in])	Maximum Acceleration Torque (N·m [lb·in])	Emergency Stop Torque (N·m [lb·in])	Backlash (arc-min)	Nominal Input Speed (rpm)	Maximum Input Speed (rpm)	Allowable Radial Load (N [lb])	Allowable Thrust Load (N [lb])	Moment of Inertia ($kg \cdot cm^2$)	Efficiency (%)	Maximum Housing Temperature	Approx Weight (kg [lb])	Environmental Rating	Fits SureServo Servo Motor
PGA070-05A1	<--->	5:1	single	70	27 [239]	50 [443]	100 [885]	5	3000	6000	510 [115]	390 [88]	0.077	95	90 °C [194 °F]	1.5 [3.3]	IP55	SVL-201(B)
PGA070-10A1	<--->	10:1	single		18 [159]	35 [310]	80 [708]				640 [144]	530 [119]	0.056					
PGA070-15A1	<--->	15:1	double		18 [159]	35 [310]	80 [708]				740 [166]	630 [142]	0.055	90		1.7 [3.7]		
PGA070-25A1	<--->	25:1	double		27 [239]	50 [443]	100 [885]				870 [196]	790 [178]	0.053					
PGA070-05A2	<--->	5:1	single		27 [239]	50 [443]	100 [885]				510 [115]	390 [88]	0.160	95		1.5 [3.3]		SVL-202(B) SVL-204(B)
PGA070-10A2	<--->	10:1	single		18 [159]	35 [310]	80 [708]				640 [144]	530 [119]	0.140					
PGA070-15A2	<--->	15:1	double		18 [159]	35 [310]	80 [708]				740 [166]	630 [142]	0.140	90		1.7 [3.7]		
PGA070-25A2	<--->	25:1	double		27 [239]	50 [443]	100 [885]				870 [196]	790 [178]	0.130					
PGA070-05A3	<--->	5:1	single		27 [239]	50 [443]	100 [885]				510 [115]	390 [88]	0.360	95		1.5 [3.3]		SVL-207(B)
PGA090-10A3	<--->	10:1	single	90	50 [443]	80 [708]	200 [1770]				1200 [270]	1600 [360]	0.750			3.5 [7.7]		
PGA090-15A3	<--->	15:1	double		50 [443]	80 [708]	200 [1770]				1400 [315]	1900 [427]	0.720	90		4.0 [8.8]		
PGA090-25A3	<--->	25:1	double		75 [664]	125 [1106]	250 [2213]				1600 [360]	2200 [495]	0.710					
PGA090-05A4	<--->	5:1	single		75 [664]	125 [1106]	250 [2213]				960 [216]	1200 [270]	2.900	95		3.5 [7.7]		SVL-210(B)
PGA090-10A4	<--->	10:1	single		50 [443]	80 [708]	200 [1770]				1200 [270]	1600 [360]	2.800					
PGA090-05A5	<--->	5:1	single		75 [664]	125 [1106]	250 [2213]				960 [216]	1200 [270]	2.900			3.5 [7.7]		SVM-210(B)
PGA090-10A5	<--->	10:1	single		50 [443]	80 [708]	200 [1770]				1200 [270]	1600 [360]	2.800					
PGA120-15A4	<--->	15:1	double	120	120 [1062]	225 [1991]	500 [4425]				2300 [517]	3000 [674]	2.800	90		8.7 [19.2]		SVL-210(B)
PGA120-25A4	<--->	25:1	double		180 [1593]	330 [2921]	625 [5532]				2700 [607]	3700 [832]	2.800					
PGA120-15A5	<--->	15:1	double		120 [1062]	225 [1991]	500 [4425]				2300 [517]	3000 [674]	2.800			8.7 [19.2]		SVM-210(B)
PGA120-25A5	<--->	25:1	double		180 [1593]	330 [2921]	625 [5532]				2700 [607]	3700 [832]	2.800					
PGA120-05A6	<--->	5:1	single		180 [1593]	330 [2921]	625 [5532]				1600 [360]	1900 [427]	11.000	95		7.8 [17.2]		SVM-220(B) SVM-230(B)
PGA120-10A6	<--->	10:1	single		120 [1062]	225 [1991]	500 [4425]				2000 [450]	2500 [562]	11.000					
PGA155-10A6	<--->	10:1	single	155	240 [2124]	470 [4160]	1000 [8851]		2000	4000	4700 [1057]	4100 [922]	11.000	95		16 [35.3]		
PGA155-15A6	<--->	15:1	double		240 [2124]	470 [4160]	1000 [8851]				5400 [1214]	4900 [1102]	11.000	90		18 [40.0]		
PGA155-25A6	<--->	25:1	double		360 [3186]	700 [6196]	1250 [11063]				6400 [1439]	6100 [1371]	11.000					